(Workshop topic - choose from list) **(do not use this space)**

Persistent luminescent materials for medical imaging

Dirk Poelman[1]
[1]Ghent University, Belgium

Persistent luminescent materials or glow-in-the-dark compounds have been known for centuries [1], but due to their limited performance in terms of total light output, they were never used for large scale applications. It is only since 1996 [2], when $SrAl_2O_4$:Eu,Dy was introduced as a new persistent phosphor, that a leap forward in both brightness and decay time was achieved. This paper has initiated substantial research, which has led to an entire family of materials, showing an appreciable afterglow for more than 24 hours [3,4].

These developments have opened up a whole new series of applications, ranging from emergency illumination, decoration and toys to medical imaging. For the latter application, materials are needed with deep red to near infrared emission, which falls in the transparency window of biological tissues. This, together with the need for red emitters for indicating emergency situations, has led to an interest in long wavelength persistent luminescence.

For most dopants which can be used for efficient energy storage and persistent luminescence, the dominant emission wavelength is strongly dependent on the local surroundings of the dopant ions in the polycrystalline host compound. Eu^{2+} is by far the most common dopant for both photoluminescence (for example for wavelength conversion for white LEDs) and for persistent luminescence [3]. However, there are only very few hosts known, notably a number of ternary and quaternary nitrides, that allow to shift the Eu^{2+} emission to the deep red. This presentation will discuss these possible hosts for long-wavelength emission from Eu^{2+}, and give an overview of alternative dopants which have been successfully used for (infra)red emission.

In addition, the potential of persistent luminescent materials for a number of other applications, such as mechanoluminescence and energy storage for 24h solar cells, will be discussed.

Submitting author: D. R., Poelman, Ghent University, Faculty of Sciences, Department of Solid State Sciences, LumiLab research group, Krijgslaan 281/S1, B-9000 Gent, BELGIUM, Tel: +32-9-264-4367;
E-mail: dirk.poelman “at” ugent.be

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